## XXI. *A Contribution to the Life History of* Agriades escheri, *Hb.* By T. A. Chapman, M.D.

[Read October 6th, 1915.]

Plates LXXXIII–CIII.

My interest in *Agriades escheri* arises from the investigations about *Agriades thersites*, since it appeared that *thersites* was, notwithstanding its close resemblance to *P. icarus*, not at all nearly related to that species, but was in many respects so similar to *A. escheri* as to suggest that *escheri* and *thersites* were quite recent derivations of a form very close to *escheri*.

There seemed, however, to be no published life-history of *A. escheri*, nor, so far as I have been able to learn, any figure of the larva, though its food-plant is referred to by several authorities, the original information apparently being from Saporta for *Astragalus incanus*, and Donzel for *Astragalus monspessulanus*, though I have not found where they published these facts. It curiously happens that in the Bulletin of the Entomological Society of France (1915, No. 8) there is reported "Notes on Lycaenid larvae by Monsieur P. Chrétien," read 28th April, 1915, amongst which is a fuller account of the life-history, running to a page of the Bulletin, than had previously appeared anywhere.

He also has notes on *L. orbitulus* and *L. eros* whose larvae he appears to have known for some time.

It appeared desirable, therefore, to learn something of the life-history of *A. escheri*. I failed, however, in 1913 to obtain any ova, and so the observations had to be postponed to 1914.

On the 28th April, as noted in Trans. Ent. Soc., 1914, p. 482, I visited the locality on the way to Berisal, where *Astragalus exscapus* grows freely, in order to find the larva of *A. escheri*, since the butterfly is not uncommon there, and this *Astragalus* seems to be the only probable food that grows in the locality. I found two larvae that I took to be *escheri*, but, as I failed to rear either, could not be sure, until this year I reared the larva from the egg, and so satisfied myself that the Berisal larvae were the same as those that were, of course, certainly *A. escheri*.

These larvae are figured on Plate LXXXIV, figs. 12, 13 and 14, and may be compared with the 1915 larvae on Plate LXXXV. They hardly differ by even the individual variation which is common in the larvae of "Blues," but is perhaps less in *A. escheri* than in many other species. The note made on April 27th, 1914, was that they were "rather dark green, darker in the dorsal trough, with a narrow yellow line down dorsal and lateral flanges, there are two pale oblique lines between dorsal flange and spiracles. The honey-gland and position of fans distinct, hair bases black, as well as many hairs. But most of the hairs on the lateral flange are white, as well as some on the dorsal flange, chiefly those forming a dorsal crest to each segment, those a little below them being dark." On April 1st: "The larva is remarkable for the very narrow but definite yellow lines, and for the distinctness of the oblique lines that look as if resulting from a thin overlaying layer of white pigment."

"There are really three whitish oblique marks on the slope of each segment: a middle one, fairly well pronounced, an upper one on the side of the projection of the dorsal flange, and a lower one in which is the spiracle; the upper and lower are rather patches, and are oblique only on their margins apposed to the middle of the three. In most views of the larva, only two of these marks are obvious, the upper or lower being evasive."

On the 7th April: "It is of a more uniform green, the pale oblique lines are less distinct and the yellow lines less vivid, the hair bases are conspicuously black, but the long hairs of dorsal and lateral flanges are colourless, except a few black ones on last segments."

Owing to ill-usage due to travelling, though both larvae pupated, the pupae were not healthy and neither progressed further.

It may be observed that in describing three pale oblique lines, one neglects the alternative of describing two darker lines, viz. the two areas between the paler ones; the difference arises from choosing to regard the paler or darker areas as the ground-colour.

These larvae eat into the central growing buds in the heart of the mass of foliage forming the plant of *Astragalus exscapus*, its habits in this respect being practically identical with those of *P. lycidas* on the same plant. Mr. Main's photograph, Plate LXXXVIII, fig. 25, shows this very

well, but the larva goes deeper than shown, practically out of sight, a circumstance that a photograph could not, of course, demonstrate.

At the end of July 1914, being at Gavarnie, I succeeded in obtaining eggs of *A. escheri* var. *rondoui*. This egg is small, 0·6 mm. across, and 0·22 mm. high. It is remarkable as having a very flat level top, and very perpendicular sides, not curving in an appreciable degree either towards the top surface or the base. The top is quite free from knobs at the intersections of the network except at the absolute margin, thence down the sides the knobs (or pillars) are well developed. A comparison with the eggs of *thersites* and *icarus* (Trans. 1914, Pl. XXXV) shows that in the flat smooth top and perpendicular sides it differs much from both these, and, if anything, *icarus* resembles it rather more than *thersites* does. The egg is photographed, Pl. LXXXVII, fig. 23.

The eggs very obligingly did not hatch until just as I reached home after the prolonged journey from Gavarnie, but began doing so immediately on my arrival (Aug. 9th).

When newly hatched the larva is very pale yellowish green, almost colourless; the dorsal hairs are very long, forming a high double crest; the lateral hairs are also very long and conspicuous. As it matures, it acquires a darker dorsal line or band, and a similar dark band a little way above the spiracles.

In comparing the panoply of hairs, lenticles, etc., there is little to distinguish the larvae of *escheri*, *thersites* and *icarus* from each other; *escheri* and *thersites* have the long hairs distinctly longer than in *icarus*—the former about 0·28 mm. against 0·21 mm. in *icarus*. The angular hairs on the prothoracic plate are very close to the posterior hairs in *escheri*, a little less close in *icarus*, and quite away towards the angle in *thersites*. I have not seized any other differences with certainty, but there are probably others. Two specimens showing the hairs, etc., are photographed, Pls. LXXXIX, XC, figs. 26 and 27.

On Aug. 18th some of the larvae were undergoing their first moult, and practically all had completed it on Aug. 21st. At this date they were 2·2 mm. to 2·5 mm. long, pale translucent green, with darker dorsal line (vessel) and a dark shade along middle of slope. The flange hairs are long, but not proportionally so long as in 1st instar, the dorsal ones form a crest, and the lateral ones rest on the leaf surface

like those in some Lasiocamps or say, more vulgarly, like a cowcatcher. As they get older (Aug. 24th), a few develop dorsal and lateral yellow flange lines (as in *Coridon*, etc.).

The armature of hairs, etc., in the 2nd instar is shown in Pl. XCI, fig. 28.

On Aug. 27th several are in 3rd instar, and these vary much in colouring, or rather perhaps in marking; some have paler, hardly yellow, dorsal and lateral flange lines; most have some indication of a darker, greyish longitudinal band along the middle of the slope—one or two have this very marked; the hair bases are black, and a good many hairs are black, so as to be quite obvious.

On Sept. 9th they seem now to be full-grown or nearly so in 3rd instar, and some have ceased feeding.

They are 4·5 to 5·8 mm. long, green, with a paler hardly yellow lateral flange line, a darker medio-dorsal line, and a similar darker (dark apple almost olive green) line half-way up the slope; on each segment this has above and below it a paler line or streak, the three together just visibly oblique (downwards or backwards) when closely observed. There is a rather darker shade just above the lateral line. Seen laterally the dorsal humps on each segment are marked; on each are several, 3 or 4, long dark hairs (about 0·3 to 0·5 mm. long). The lateral hairs are pale brown.

In one larva the lateral line and one down each dorsal flange may be called yellow, and the darker shades can only be recognised as having a slightly different tone from the ground-colour. Another larva is rather darker, so that the lower portion of the slope is dark. Most show a dark mark near the spiracle.

Sept. 16th.—All seem to have laid up for the winter, most on the leaflets of the food-plant, much as they do when at rest, but still feeding; others on the bottom of the box. Their colours vary from a nearly uniform green, with just a suspicion of paler (yellowish) dorsal and lateral flange lines, and still fainter oblique lines; others are very dark with dark shading over large areas. The drawings by Mr. Knight are excellent; they perhaps hardly show the oblique lines to be quite as oblique as they are. Really the obliquity is very faint, and only shows at each end of the paler shades above and below the dark line, which is nearly straight.

Several varieties of the larva in 3rd instar are shown in Mr. Knight's drawings, Pl. LXXXIII, figs. 1, 2, 3 and 4.

The larvae were placed in a refrigerator during the winter

at a temperature of about 34° to 39°. Observing these and other larvae during the past winter, I have arrived at the opinion that the mortality amongst hibernating Lycaenid larvae under my care, or want of care, has been chiefly due to letting them get too dry. When made sufficiently damp afterwards they become mouldy, and one concludes they died from being too damp, and so one's procedure is corrected in the wrong direction. The correct way is to look them over carefully every two or three weeks and see that they are just right. The disturbance may not be good for them, but it is a much less evil than their getting either too damp, or, in an effort to avoid this, too dry.

On Feb. 8th, 1915, I brought thirteen larvae into a warm room; not till the 24th did they begin to eat, when one small mine was seen in a leaf of *Astragalus*. Of these thirteen larva ten were put on a growing plant on Feb. 28th.

On March 9th, of the three kept in tins, two are eating a little of a young *Astragalus* leaf.

March 13th.—One (No. 1) of the three has moulted this morning (into 4th instar) without having grown at all or eaten more than a very trifling meal.

March 18th.—No. 2 moulted this morning. No. 1 is eating but very moderately.

March 20th.—The larvae in 4th instar are in several instances, as noted two days ago, green, with dorsal and lateral stripes almost yellowish; but one at least is quite dark, of much the aspect of the darkest of those in 3rd (hibernating) instar.

No. 1, 7 mm. long, green, with narrow yellow lateral line, dorsal lines (flanges) a little paler but not yellow, has oblique dark band on each segment, half-way up slope, bordered above and below by paler green; medio-dorsal line is also rather dark, dorsal outline (seen laterally) a little serrated, each segment rather higher at its posterior than anterior margin.

No. 2 is a darker larva, so that the dorsal flange lines seem to be yellowish, and the oblique lateral lines are reinforced by (1) a slight depression at posterior margin of each segment of the dorsal flange lines, (2) and (3) the yellowish lines above and below darker central slope line, (4) a yellowish patch, slightly oblique near spiracles; the yellow lateral line is not at all oblique.

March 30th.—No. 3 has moulted for third time.

March 31st.—The larvae in 4th instar, so far as may be

gathered from the three specimens, get greener as they grow, very decidedly more than mere spreading of the dark hair bases would cause, probably due to ingestion of fresh food.

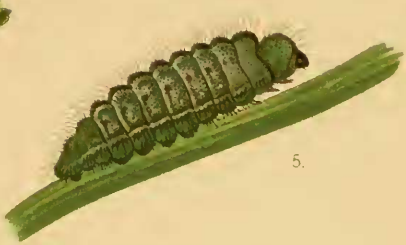
April 4th.—No. 3 looks dark and small and has not yet begun feeding after moult. No. 2 still feeding, length 7·3 mm. No. 1, apparently laid up for moult (4th and last), is barely 7 mm. long, but thickened up to 2 mm., fairly uniform in width to 6th abdominal segment, width and height nearly equal, tapers a little after 6th. Colour unchanged, yellow lateral line, pale dorsal flange lines, and oblique lines chiefly marked by the darker shade between them at mid-slope; this shade is divided on each segment into an anterior and a posterior patch.

On entering 4th instar, No. 3 as an example is 4·3 mm. long, of a warm (or reddish) grey, not at all green, with lighter dorsal flange line and mid-slope line, and a narrower and rather oblique one between these. In the wide interspace between mid-slope and lateral (hardly yellow) lines is only a central small pale shade, the rest ground-colour. It very much, in fact, resembles the third-stage larva, but as it grows takes on quite a green coloration. These several aspects are shown on Pl. LXXXIII, figs. 5, 6, 7. The figures might give the impression that the larva is as green in the 3rd as in the 4th instar; it may be in some instances, but as a rule the larvae are generally without much green in 3rd instar, and all are green when well grown in the 4th. The skin structures are shown on Pl. XCIII, with some details on Pl. XCIV.

April 9th.—No. 1 has moulted into 5th (last) instar this morning; it is now an especially green larva, the yellow lateral line is really yellow, but is the only portion (head and legs, of course, excepted) that is not merely some shade or variant of green. The dorsal ridges (flanges) are a paler yellowish green, the dorsal trough darker. The slopes show (on each segment) the darker oblique band between the paler (yellowish) lines, and the spiracles are marked as whitey yellow dots. The fans, or rather their sites, are also seen as conspicuous whitish spots. Some of the dorsal hairs are dark, but the majority nearly colourless; the bases are dark, but have little effect on the general tone of colour. On touching the 5th and 6th abdominal segments, the fans were everted and the head and front segments raised, showing irritation rather than any pleased response as to ants.

April 14th.—No. 2 moulted into last instar.

1



5.

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E.C. Knight del

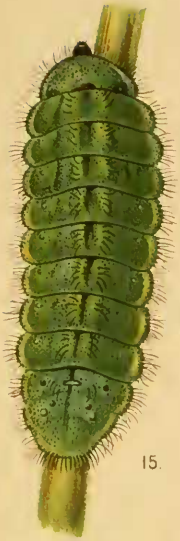
Hullard and West, Newman chr.

A. ESCHERI, LARVÆ IN 3rd & 4th INSTARS.


E. C. Knight, del. et pinx.

Adlard & Son and West Newman.

LARVAE OF AGRIADES ESCHERI.



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18.

*x 5*

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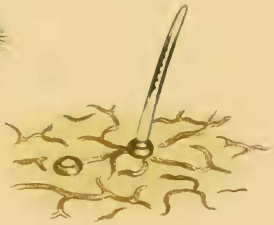
16.

20. *nat. size.* *x 3*



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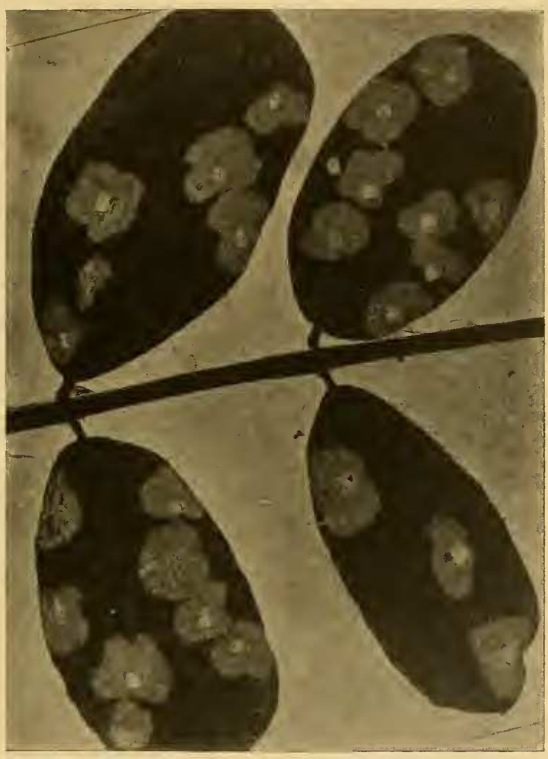
E.C. Knight del.
F.W. Frohawk ,,

Adlard and
West, Newman chr.

A. ESCHERI, LARVA IN 5th (LAST) INSTAR.



*Photo, A. E. Tonge.* *Anglo-Engraving Co., Ltd.*

FIG. 22.

A. ESCHERI, ASTRAGALUS MONSPESSULANUS LEAVES EATEN BY YOUNG LARVAE.